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Dynamic Topography of the St. Francois Mountains

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Introduction (Initial Observations)

- Most mountains end at pointed peaks. However, many of the St. Francois Mountains end at flattened peaks. Why is this?
- Many sub-horizontal topographic features seem to occur at similar intervals of elevation.
- Could these topographic features be related to other sub-provinces of the Ozark Plateau?

Goals (Hypothesis)

- Demonstrate that sub-horizontal topographic surfaces in the St. Francois Mountain exist.
- These topographic surfaces are related to relict peneplains in the Ozark Plateau.



Figure 1: Orthographic view of the St. Francois Mountains. Red dots indicate Taum Sauk Mountain (left) and Shepherd Mountain (right).

Approach (Methods)

- Qualitative and quantitative analysis of topographic features in the St. Francois Mountains (see Figure 1) using digital elevation models (DEMs) and ArcGIS.
- Use of Google Earth for lower resolution tasks.
- Search for similar topographic features and compare elevation data from the St. Francois Mountains in other sub-provinces of the Ozark Plateau.
- Field work will be conducted in the St. Francois Mountains to augment preliminary findings.
- Major landmarks:
 - Taum Sauk Mountain (e.g., see Figure 2).
 - Shepherd Mountain
 - Buford Mountain

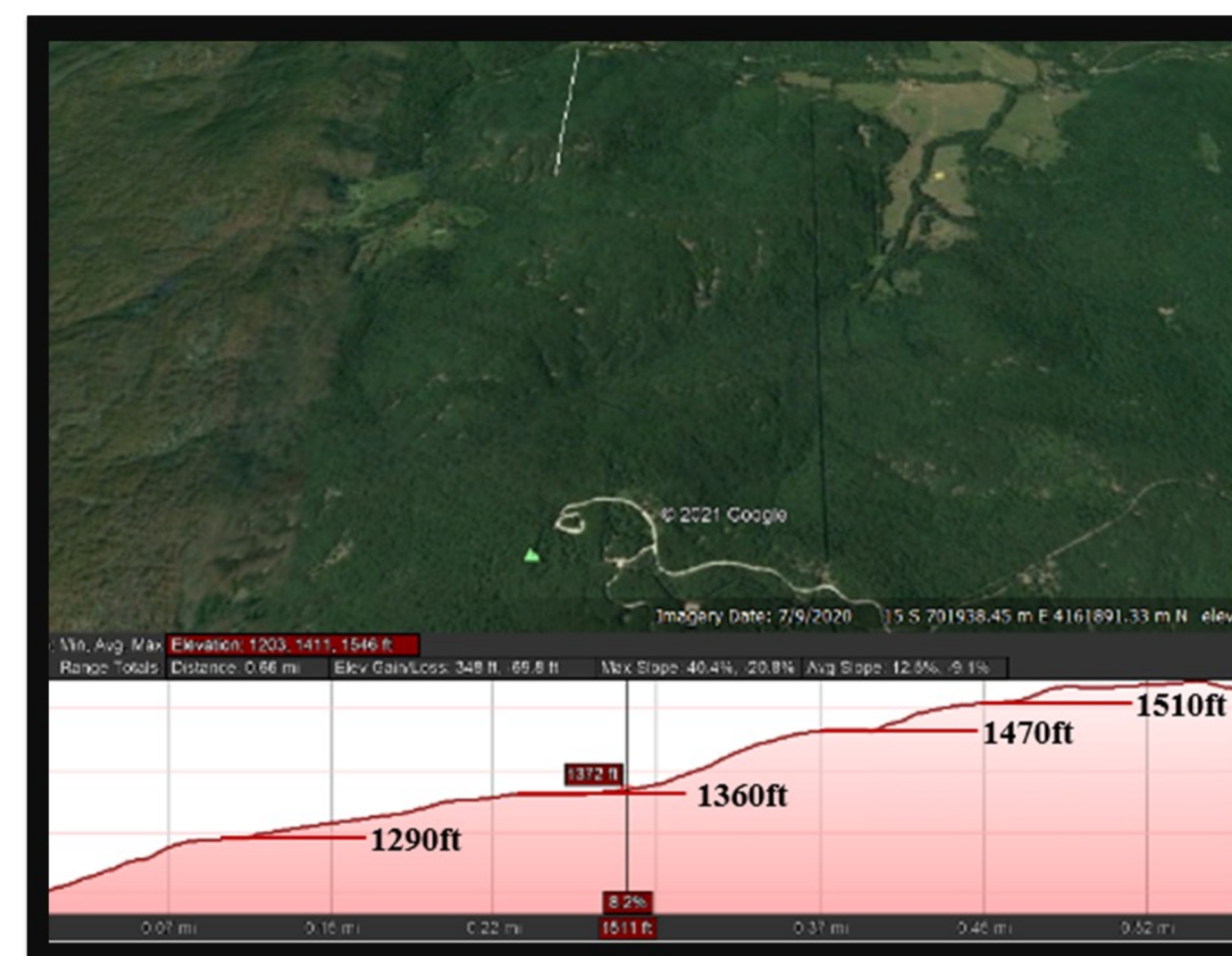


Figure 2: North-south Topographic cross-section north of Taum Sauk Mountain showing knickpoints at elevations of 1290ft, 1360ft, 1470ft, and 1510ft.

Preliminary Findings

- Qualitative analysis of topographic profiles in Google Earth revealed the presence of knickpoints. (see Figure 2).
- Knickpoints are changes in slope that arrive at a sub-horizontal surface.
- Quantitative analysis of elevation data in Microsoft Excel (see Figure 3).
- Figure 3 shows that the three topographic features studied occurred on the following intervals of elevation:
 - Knickpoints: ~1700-900ft.
 - Sub-Horizontal Surfaces: ~1780-1545ft.
 - Valley Floors: ~1470-1350ft. and ~1200-900ft.
- Possible U-shaped valley observed on the western slope on Shepherd Mountain. This may be an artifact of a 2-dimensional slice.

Elevations of Topographic Features in the St. Francois Mountains

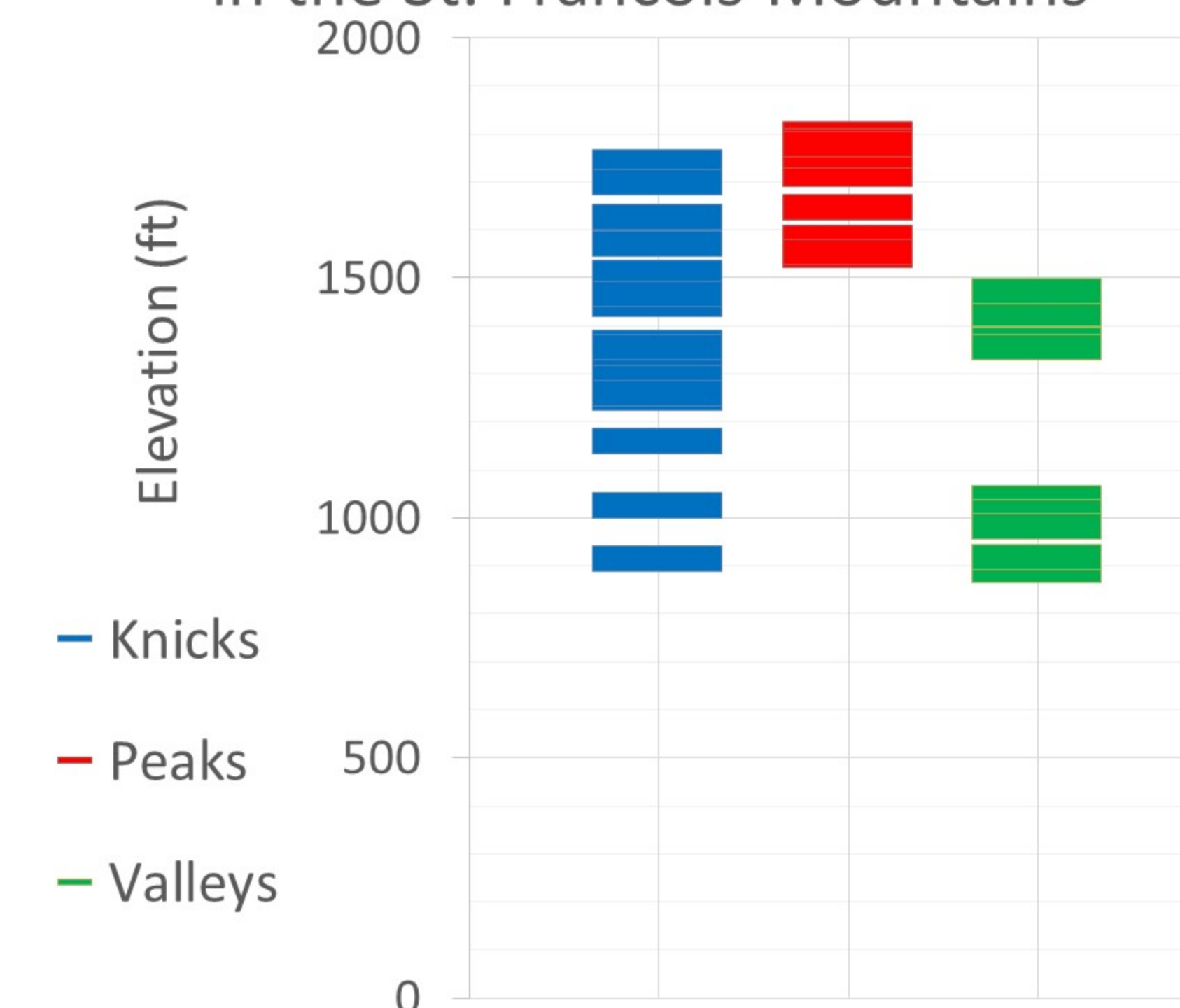


Figure 3: Chart comparing the elevation data of several major topographic features observed.

Discussion

- Sub-horizontal surfaces, knickpoints, and valley floors exist as relict surfaces in the St. Francois Mountains. (see Figure 2)
- These topographic features occur at specific elevation intervals (see Figure 3).
- Several of these features correspond to other sub-provinces of the Ozark Plateau.
 - Taum Sauk Mtn. and Springfield Plateau (elevations ~1700ft)
 - Knickpoints and Salem Plateau (elevations ~1200ft)
- Initial findings warrant further investigation with 3-dimensional investigation (ArcGIS).

Conclusion

- Relict surfaces in the St. Francois Mountains and the Ozark Plateau suggest they formed by the same processes during the same time period.

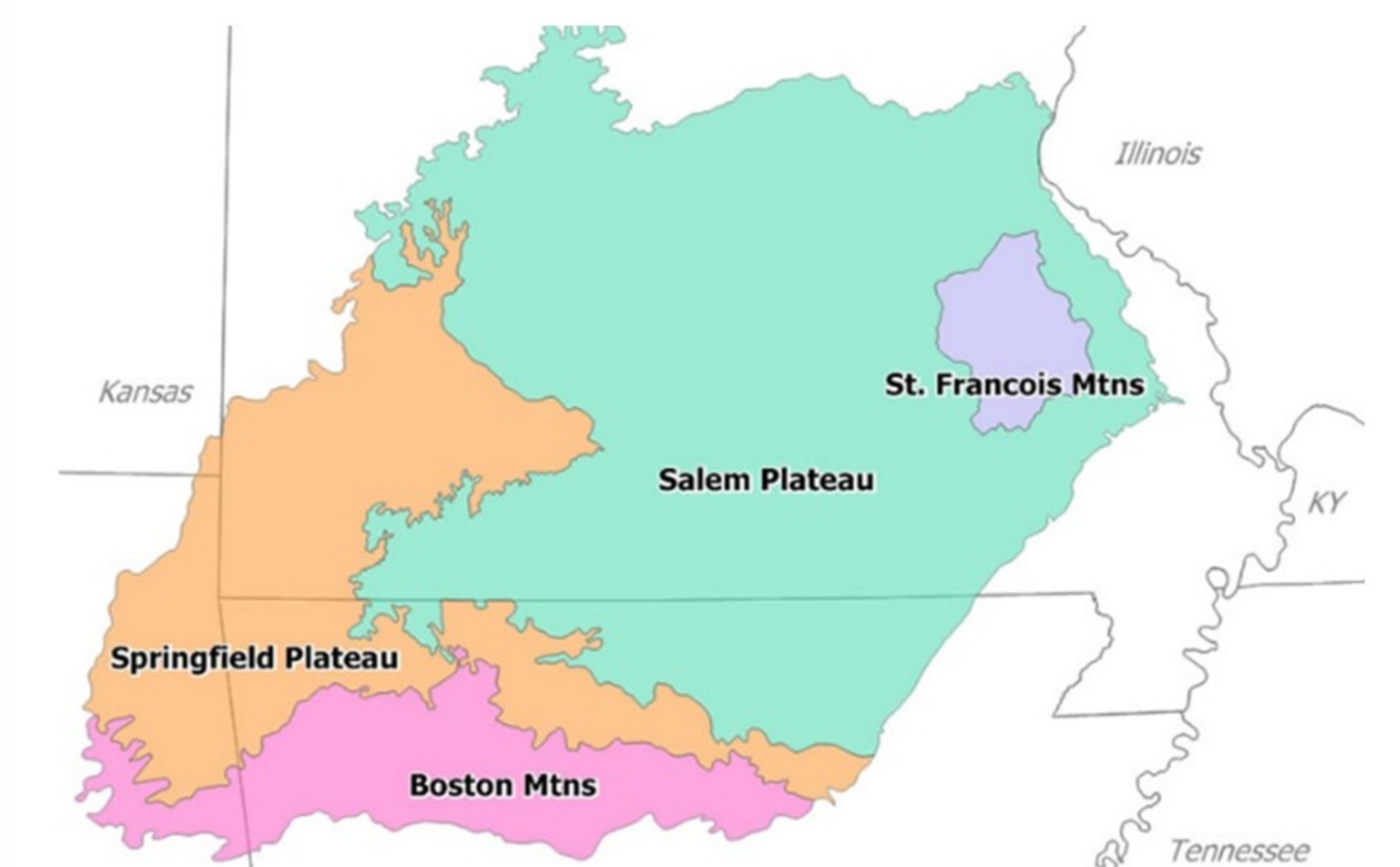


Figure 4: Regional map of the Ozark Plateau indicating its four sub-provinces. Future research will likely extend southwest toward the Springfield Plateau.